THE HAWAIIAN PLANTERS' MONTHLY

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SUGAR PRICES JUNE 14 TO JULY 14, 1909.

Date.	96° Centrifugals per lb.	96° Centrifugals per ton	88° Beets per 100 wt.	88° Beets per ton
June 14.....	3.92¢	$78.40	10s 6d	$84.20
" 16.....	3.92¢	78.40	10s 5¼d	84.00
July 2.....	3.92¢	78.40	10s 6d	84.20
" 7.....	3.92¢	78.40	10s 5¼d	84.00
" 13.....	3.92¢	78.40	10s 6d	84.20

NOTE.—Where dates are omitted, prices remained unchanged from the last quotations.

THE SUGAR MARKET.

N. Y. Correspondence of Louisiana Planter, June 25.

The trade in refined sugar during the next three months is expected to be big. Good business will keep prices firm. More orders are coming in every day and the improvement is putting more confidence into the situation. Prices are not going ahead of developments, but conditions ruling now are strong enough to keep quotations steady and if trade comes up to expectations there will be advances. The sugar crops this year are large. The extra production in Cuba will easily be taken in the United States, as will the tonnage produced in Porto Rico, Hawaii, Louisiana and the domestic beet crop; but unless we have a big increase in consumption we will not need as many Java sugars as we have bought in other years. Java will turn out a big crop and the supply must be taken care of somewhere. The Java sugars do not arrive in the United States until the end of August. Those cargoes are not now a weight upon the market, but they set a limit in values that quotations will not be able to pass without the aid of good business. Javas are offered today at equal to 4.13.

STATISTICS BY SPECIAL CABLES.

Willet & Gray, July 1.

Stocks in the United States and Cuba together of 575,318 tons, against 593,116 tons last week and 416,157 tons last year, an increase of 159,161 tons from last year.

EUROPE.—Stock in Europe 1,797,000 tons, against 1,891,000 tons last year.

VISIBLE SUPPLY.—Total stock of Europe and America, 2,372,318 tons, against 2,307,157 tons last year at the same uneven dates. The increase of stock is 65,161 tons, against an increase of 50,754 tons last week. Total stocks and afloats together show a visible supply of 2,517,318 tons, against 2,502,167 tons last year, or an increase of 754 tons.

THE WEEK.—Raws unchanged. Refined declined .05c.; reacted same; and again declined .05c. Net cash quotations this date are: Centrifugals, 3.92c.; Muscovado, 3.42c.; Molasses, 3.17c.; Granulated, 4.70c. Receipts, 56,202 tons. Meltings, 50,000 tons. Total stock in four ports, 371,318 tons, against 365,116 tons last week, and 300,157 tons last year. Beet sugar quotations, f. o. b. Hamburg, 10s. 5¼d. per cwt. for 88° analysis, equal to 4.20c. for 96° test Centrifugals at New York. First Marks German Granulated, f. o. b. Hamburg, 12s. 6d., equal to 4.80c. New York duty paid.

Estimated afloats to the United States from Cuba and West Indies, 45,000 tons; Hawaii, 45,000 tons; Java, 35,000 tons; Philippines, Peru, etc., 15,000 tons. Total, 140,000 tons, against 195,000 tons last year.

RAWS.—The week under review opened with raws firmly held, particularly for the July shipment.

European markets remain unchanged, but with rather an easier tone and tendency noticeable, owing to extreme dullness and very favorable beet crop reports as cabled to us by Mr. F. O. Licht.

The important influence of the immediate future, but not yet realized, is the problem of the selling of the new Java sugar crop now beginning to appear on the market. The price asked for Javas is 11s. c. & f., equal to 4.13c. per pound, or 21c. per 100 pounds above Cuba values of 96° Centrifugals, and, with London quotation for Javas at 11s. 4½d., floating landing, equal to 11s. c. & f. to New York, the natural movement of the Javas will be towards England, rather than the United States. Some pressure of Javas upon the London market is now looked for, which may have an influence upon present quotations, leading to a nearer approach to Cuban parity here, from which sales of Javas to the United States may result, provided fair progress can be made in grinding and shipping the crop. However, the reports received

from Java all through the month of June have told of continued rain, and today we have a special cable from Batavia reporting heavy rains generally and haresting delayed, which will have the tendency of relieving the pressure to sell for the present, at least. The American refiners will not suffer for the lack of June Javas, but July-August shipment (September-October arrival) will be acceptable, so as to insure ample working stocks, and the progress of the crop making in Java from now on will be watched with interest.

A sale of 40,000 bags Cubas second-half July shipment, was put through late today, at 2 9/16c. c. & f. (3.92c.) and the market closes with a feeling that prices are low enough.

SAN FRANCISCO.—Receipts from January 1 to June 21:

	Tons	
From—	1909.	1908.
Hawaii	104,544	126,283
Philippine Islands	.....	.....
Central America	1,076	968
Java	.....	.....
Peru	1,976	.....
China, Mexico, etc.	204	159
Total	107,800	127,410

CUBA CROP.—It will be interesting to follow the movement of this crop, as compared with the two preceding campaigns from the standpoint shown by the following figures corrected weekly to June 29, 1909.

	1909.	1908.	1907.
Stock in entire Island, Jan. 1 of old crop—Tons	None	9,318	None
Estimated crop	1,400,000	961,958	1,427,673
Total supply	1,400,000	971,276	1,427,673
Receipts at United States Four Ports and New Orleans, since beginning of crop..	1,101,000	751,318	1,111,000
Estimated afloat to United States	35,000	20,000	20,000
Consumption of Cuba, Jan. 1 to date	28,000	27,000	24,000
Export and consumption	1,173,000	798,318	1,155,000
Balance supply, estimated	227,000	172,958	272,673
Estimated stock in Island this date	212,000	135,000	235,000
Estimated total visible production to date	1,385,000	924,000	1,390,000

According to special reports received by us from all parts of the Island for week ending June 25th, the rainy weather continues, which is favorable for the growing cane crop. The rainfall in western provinces ranged from about one to two inches, while in eastern provinces from two to four inches fell. Prospects for the

growing crop are excellent and a few centrals still continue to work on the old crop. Temperature ranged from 69° to 91° F.

EUROPEAN BEET CROP.—F. O. Licht cables us specially from Magdeburg, June 25, 1909: "Weather favorable for growing crop."

June 29, 1909: "Weather favorable for the growing crop."

JAPAN.—*Consumption Tax on Sugar.*—By a recent law the consumption tax on brown sugar in barrels has been reduced from 3 to 2 yen per 100 kin (1 yen = 49.8c.; 1 kin, or catty, = 1⅓ lbs.). Molasses and other grades of sugar below No. 8, Dutch Standard, are unchanged at a duty of 3 yen. The drawback allowed on the exportation of refined sugar manufactured from imported raw sugar, which was to have expired on March 31, 1909, has been extended to July 16, 1911.

SUGAR CROPS OF THE WORLD.

These figures include local consumption of home production wherever known.

Willett & Gray's estimates of cane sugar crops, July 1, 1909.

	Crop begins.	1908-09.	1907-08.	1906-07.
United States—Louisiana	September	350,000	335,000	230,000
Texas	September	15,000	12,000	13,000
Porto Rico	January	215,000	200,000	210,000
Hawaiian Islands	November	475,000	465,288	392,871
Cuba, crop	December	1,400,000	961,958	1,427,673
British West Indies—Trinidad, exports	January	45,000	41,626	45,631
Barbados, exports	January	17,000	31,852	32,950
Jamaica, exports	January	4,500	10,718	13,971
Antigua and St. Kitts	January	24,000	20,000	28,319
French West Indies—Martinique, exports	January	35,000	35,943	36,764
Guadeloupe	January	39,000	37,500	38,960
Danish West Indies—St. Croix	January	14,000	13,000	13,000
Haiti and San Domingo	January	80,000	60,000	60,000
Lesser Antilles, not named above	January	6,000	5,000	5,662
Mexico, crop	December	125,000	123,285	119,496
Central America—Guatemala, crop	January	7,500	7,178	7,469
San Salvador, crop	January	6,500	5,490	6,008
Nicaragua, crop	January	4,500	4,175	3,905
Costa Rica, crop	January	2,500	2,415	2,365
South America—Demerara, exports	Oct. & May	125,000	99,737	120,334
Surinam, crop	October	14,000	13,000	13,000
Venezuela	October	3,000	3,000	3,000
Peru, crop	October	150,000	135,336	161,156
Argentine Republic, crop	June	150,000	109,445	116,287
Brazil, crop	October	260,000	180,000	215,000
Total in America		3,567,500	2,912,946	3,316,821

Asia—British India—Crop (consumed locally)	December	1,841,800	2,046,900	2,205,300
Java, crop	May	1,241,885	1,156,477	1,011,546
Formosa-Japan, crop (consumed locally)	December	80,000	68,450	81,448
Philippine Islands, exports	December	150,000	135,374	121,977
China (consumption large, mostly imported)		.....	.....	.....
Total in Asia		3,313,685	3,407,201	3,420,271
Australia and Fiji—Queensland	June	151,554	188,307	182,000
New South Wales	June	15,000	23,418	24,000
Fiji Islands, exports	June	65,000	69,000	43,000
Total in Australia and Polynesia		231,554	280,725	249,000
Africa—Egypt, crop	January	45,000	40,000	42,195
Mauritius, crop	August	195,000	170,000	220,000
Reunion, crop	September	37,000	35,000	37,500
Natal, crop (consumed locally)	August	35,000	35,000	27,130
Total in Africa		312,000	280,000	326,825
Europe—Spain	December	22,000	11,000	16,400
Total cane sugar crops (W. & G.)		7,446,739	6,891,872	7,329,317
Europe beet sugar crops (F. O. Licht)	September	6,502,000	6,562,274	6,710,808
United States beet sugar crop (W. & G.)	July & Oct.	384,010	440,200	433,010
Grand total cane and beet sugar—Tons		14,332,749	13,894,346	14,473,135
Estimated increase in the world's production—Tons		438,403	.....	.....

THE PLANTERS' MONTHLY.

Mr. R. D. Mead, who has for several years past been the able editor of the Planters' Monthly, retired from the position with the June number, owing to the increasing duties of his position as assistant secretary and statistician of the Hawaiian Sugar Planters' Association, and Mr. Lorrin A. Thurston succeeds to the editorship, beginning with this issue. Mr. Thurston is not new to the position, having been editor of the Monthly during 1885-1887.

To the Practical Sugar Planters of Hawaii:

In assuming the editorship of the Planters' Monthly, I desire to draw to your attention that there are two distinct fields which the magazine should cover, viz:

1. The Sugar industry in Hawaii, and other local subjects connected therewith, or of special interest to sugar planters.
2. The Sugar industry, and allied subjects, in the world at large.

The editor has the advantage of an exchange list of the principal sugar and agricultural magazines and papers of the world and is in receipt of a great number of bulletins and official publications bearing more or less upon the subject matters to which the Planters' Monthly is devoted. It is impossible for planters who are at work from daylight to dark, to find the time to wade through 30 to 50 technical magazines and papers a month, to get the benefit of the comparatively small amount of material having a bearing upon conditions in Hawaii or which are otherwise of special interest locally.

The readers of the Planters' Monthly are entitled to have the matter in these numerous publications, which is of local interest, condensed for their information. This the editor will endeavor to do, to the best of his ability.

The second function of the Planters' Monthly is to record local progress and happenings, and to bring the planters of Hawaii into more intimate acquaintance with each other, and to make known, to mutual advantage, the experiments, developments and progress going on in the islands. The editor can stumble into some knowledge of the facts, and, by personal canvas, which can never be very complete, ascertain some more; but the full knowledge of what is going on is, after all, known only to the planters themselves. If they will each, from time to time, communicate to the Monthly what is being done in their vicinity that is of interest to them, it will certainly be of interest to other planters also; and between them all a most valuable and interesting feature will be added to the magazine.

I will undertake to do everything that I can to make the Monthly interesting and valuable to its readers, and ask that those who are in a position to help toward that end may do so. Between us I believe that we will be able to produce something that is worth while.

LORRIN A. THURSTON.

EDITORIAL NOTES.

The Division of Agriculture and Chemistry of the Hawaiian Sugar Planters' Association has issued a 58-page Bulletin, No. 28, on "Fermentation of Hawaiian Molasses," by S. S. Peck and Noël Deerr; and an 88-page Bulletin, No. 29, on "The Action of Soluble Fertilizers on Cane Soils," by C. F. Eckart. These will be reviewed in the next number of the Planters' Monthly.

The Porto Rico cane crop for 1909 has been harvested and shows a production of 281,000 long tons as against 230,000 tons for 1908. There are 43 sugar mills. One, the "Guanica," produced 42,000 tons. Only five others produced 10,000 tons and upward. The others produced from 1,036 tons, which is the smallest crop reported, to 9,375 tons. The Louisiana Sugar Planter predicts that Porto Rico will soon equal, if not surpass, the annual sugar crop of Hawaii.

The appropriation by the Federal Government of $2,000 with which to try the experiment of planting coniferous trees on the high lands of Hawaii, is evidence of the broad lines upon which that department is managed. It is also a pointer to Hawaii that setting apart forest reserves does not create a forest. It was necessary to have the reserves first created, in order to secure places in which trees could be preserved from live stock and depredation: but large portions of the reserves have been denuded of trees in the past, or never were in forest. The time has now come when, if our forest policy is to be a progressive one, tree planting must supplement the setting apart of places for them to grow, or we will be placed in the ridiculous position of a man who provides a fine house to live in and then never moves into it.

Private companies and persons are doing considerable tree planting; but the government has done none since work at Nuuanu Pali, in Honolulu, was stopped, some six years ago. It is high time that the government, as well as private companies who are vitally interested in the water flow and therefore in forest propagation, should concert for an active forest planting campaign.

DEVELOPMENT OF SUGAR MACHINERY.

Written by ROBERT CATTON, for Report of Honolulu Chamber of Commerce.

(Amendment at request of Mr. Catton.)

In beginning to write of the "Development of Sugar Machinery in Hawaii," as I have seen it develop during the past thirty years, I feel what a lot I have forgotten and I must begin by asking the indulgence of readers with better recollections than mine of the various stages in the evolution of the Hawaiian Sugar Factory.

I made my first acquaintance with the subject in Glasgow where I assisted in the "getting-out" of the "eight-ton plants" which began to come here in 1878. A description of one of them may serve to illustrate the "Modern Mill" of thirty years ago.

There were two pairs of Compound Boilers, flue and multi-tubular, set tandem. One 3-roll mill with its engine and gearing took care of the crushing as well as could be expected; the usual size of the rollers being 26"x54". The juice was pumped into from four to six 500-gallon clarifiers from which after being limed, and in some cases skimmed, it ran by gravitation to the "Steam Train." This train consisted of two cleaning pans and a concentrator placed so that the juice ran from one to the other; long, shallow pans with heating coils in the bottom of them; they all required live steam to make them go and took lots of it, the concentrator especially.

The syrup ran from the concentrator into tanks, holding 1000 gallons each, on the ground floor, from which it was drawn into the vacuum pan and again reached the level of the clarifier stage.

The *masse-cuite* was "struck" into the mixer upon which the centrifugals were hung and the dried sugar conveyed on a belt or simply dropped to the sugar-room floor.

The molasses ran into a tank from which it was pumped into a "blow-up" and prepared for reboiling. Coolers to receive the molasses-sugar were provided with wheels to move them about on.

This plant was contained in an iron building 40'x80' with sheds over the boilers and rollers, and the price of it was $40,000.00. It was said that the Honolulu people knew what they wanted and how much money they had to buy it with. There were modest people in Honolulu, once.

Barring the rollers which got to be too modest altogether and the sheet iron "steam train" which wore out, none too soon; most of that machinery is still at work, though not always where it was originally set down.

The iron building which contains the Inter-Island company's machine shop came from Maui and the original Eleele Mill building, recovered from the wreck of the "Eskbank" on the reef near

Diamond Head, is now at Wainiha covering the McBryde electric generators.

Different plantations had different arrangements, but the process I have outlined was practically the same all over the Islands, a process that bristled with weak points though they were not so very visible then. The extraction was very imperfect but the outstanding trouble was the difficulty of keeping the voracious open concentrator supplied with steam, or to put it in other words, the weak point that was most visible was the cost of fuel to supplement the megass. In some districts the megass was spread on the ground, weather permitting, and dried by wind-rowing, but all the mills had trash houses, some of them of immense size and elaborately ventilated. It used to take weeks to get the megass dry enough to burn and the cost of handling it was a very serious item.

The problem of handling, to better advantage, the juice extracted took precedence of the desire to get more juice out of the cane and evaporation by multiple effect was installed, on several plantations, early in the "eighties". Several variations of apparatus on this principle have had and still have their vogue, but the "standard effect" of two, three and four vessels, improved in their details, still holds its own in general estimation. There is no Hawaiian mill now, that I know of, without its multiple effect evaporator.

When it was found that steam sufficient for the work of the mill could be generated by the use of trash alone as fuel, men began to look for means of getting more juice out of the cane, and the first departure in this direction was the "five-roll mill," arrived at by placing two rollers behind the original three. This two-roller, one-on-top-of-the-other mill commended itself by requiring no trash-turner; various arrangements of it were tried and several plantations were equipped and run for some years with three two-roll mills to do all the crushing, but no kind of mill combination, at that time, gave an extraction that was considered satisfactory.

Then somebody suggested the "diffusion process" which was a step backwards in respect of fuel economy. "Never mind," it was said, "if we recover more than enough more sugar to pay for the coal we'll have to burn." There were, I think, six diffusion plants installed on as many of the plantations: most of them were short-lived, but one ran for fifteen seasons and was replaced by a modern crushing plant two years ago.

Diffusion, as applied to cane, was found to be a cumbrous and inelastic process as compared with crushing, and it is not likely ever to be used again in the manufacture of cane sugar. Maceration has taken its place as a means of applying water to assist in depriving the cane of its coveted sweetness.

The present system of triple crushing had its inception about

1895 when one of the Diffusion plants gave place to a so-called "Cora" mill such as had been successfully used in Louisiana. Since then nine-roll mills have become almost universal and there are several plantations on which quadruple crushing is carried out by four sets of three rollers.

In nearly every case the cane is prepared for the rollers by "crushers" or "cutters," sometimes by both, and with liberal maceration, the possible maximum of extraction seems to have been very nearly arrived at. The fuel question does not worry the manager nowadays.

Talking of fuel suggests a word about boilers. As I have said, the popular boiler of thirty years ago was a combination of the "flue" and "multitubular," and some of those are at work yet, but there have been no new flue boilers put in for a long time. The "multitubular" retains its place as a favorite in comparison with the various types of water-tube boilers which have been introduced, and development in this department has consisted chiefly in the better arrangement of the boilers, their settings, furnaces and flues and the application of machinery for conveying the megass from the rollers to the furnaces.

The saving of labor at both ends of the mill, during the time under review is very remarkable. There was always the flume to deliver the cane in the Hilo district, but where bull-teams or even railroad cars were used, it took from ten to twenty men to feed the mill. Bull-teams are no longer seen in the mill-yard and mule-teams very rarely; the cars are run alongside the carrier and the cane transferred by an unloading machine requiring one or two men to work it. At the other end, the trash disappears on a conveyor somewhere near the roof of the house, to be distributed by appropriate chutes and cremated "where it will do the most good." You may find other two men in the boiler-house seeing that each boiler gets its share of fuel and water.

Concurrently with the better crushing of the cane, a variety of vessels and appliances have been installed with a view to improving the clarification of the juice or, more correctly, to simplify the handling of it during the clarifying and settling processes, but the two essentials, lime and time, are as essential as ever.

In the treatment of the evaporated juice—the conversion of the syrup into *masse-cuite*, in the vacuum pan—the development has consisted chiefly in the increased size of the apparatus employed, with such modifications of details as have, from time to time, suggested themselves.

The first grade or No. 1 sugar continues to be "struck" into long tanks, still called "mixers," though the mixing or stirring gear with which some of them were equipped, was taken out long ago. The treatment of the lower grades has undergone, in many of the factories, a very considerable change, however. Formerly it used to be struck or run or conveyed in some way

to coolers of all sorts and sizes and there allowed to granulate, after which it had to be reconveyed to the mixer. Now, by the use of crystallizers it is handled mechanically or by gravitation and much room as well as a great deal of "cleaning-up" saved. Opinions vary as to the value of the crystallizers in the recovery of the finished product, but this is certainly a much cleaner and neater way of treating the molasses sugar than the old one.

For drying sugar nothing has taken the place of the Weston Centrifugal, the prettiest piece of machinery in a sugar mill, but it too has undergone some development. The 30-inch size has given place to 40-inch machines in many cases, and a good many of them are now driven by water power, which does away with all the belting and pulleys and much of the framing. This system is gradually taking the place of the belt-drive in new installations. A decided improvement is the substitution of a single spindle with ball-bearings for the old double spindle and washer arrangement.

The first time I saw Filter Presses in use was in 1880 and they were made of wood. It took a long time to get them introduced but now the iron substitutes are considered a necessary part of the equipment, and some of them do their work so well that the mud is discharged from them with less than one per cent. of possible sugar in it.

There is a great deal of machinery accessory to the growing of the cane and the making of the sugar,—pumps, steam plows, locomotives, cane loaders, etc., etc., of which I have taken no notice. I have not attempted to treat of the development of electrical appliances; nor of the almost perfect chemical control which now obtains where it was not thought of thirty years ago; nor have I mentioned what is more a development in manufacture than in machinery, the refining of the sugar on one of our plantations.

Reverting to the eight-ton-plant and the cost of it—$40,000.00—with which I began this paper, it is not an exaggeration to say that its place has been taken by the eighty-ton-plant at a cost of $400,000.00, but a more significant contrast may be found by the layman in the increase of production from 20,000 tons of sugar in 1878 to 500,000 tons in 1908.

10 HAWAIIAN SUGAR CROPS, 1898-1907. From September 30, 1898, to October 1, 1907.

ISLAND OF HAWAII.	*Tons. 1898.	Tons. 1899.	Tons. 1900.	Tons. 1901.	Tons. 1902.	Tons. 1903.	Tons. 1904.	Tons. 1905.	Tons. 1906.	Tons. 1907.
Waiakea Mill Co	7,763	9,191	9,226	10,800	8,700	9,954	6,151	7,661	10,766	8,186
Hilo Portuguese Sug. M. Co	260	932	967	.....	.....	.....	.....	.....	.....	.....
Hawaii Mill Co., Ltd	.....	.....	.....	843	985	1,503	1,728	1,438	1,825	1,800
Hilo Sugar Co	8,390	6,880	7,841	10,214	9,255	13,108	7,701	9,971	11,751	11,649
Onomea Sugar Co	8,904	8,404	7,131	8,722	11,880	13,472	10,940	11,049	13,930	12,432
Pepeekeo Sugar Co	6,914	7,350	6,207	7,173	6,627	6,000	4,907	6,167	6,477	6,677
Honomu Sugar Co	4,932	4,968	5,328	4,401	6,235	6,384	5,489	5,909	5,852	5,502
Hakalau Plantation Co	9,218	8,980	11,931	10,932	11,700	11,293	8,396	10,862	12,869	11,914
Laupahoehoe Sugar Co	3,971	5,337	4,119	5,504	7,909	4,856	4,336	5,866	7,864	7,848
Ookala Sugar Plan. Co	3,555	3,564	3,302	4,968	1,157	3,942	2,214	3,712	3,223	5,352
Kukaiau Plantation Co	1,170	1,748	1,525	2,000	1,118	1,746	1,275	1,415	2,154	2,103
Kukaiau Mill Co	1,170	1,732	1,530	2,000	1,118	1,746	1,274	1,416	1,435	1,402
Hamakua Mill Co	4,133	6,081	6,078	7,808	2,105	6,950	4,691	5,925	6,358	6,835
Paauhau Sugar Plan. Co	3,509	7,529	7,629	9,635	1,322	9,136	7,533	8,006	8,795	7,857
Honokaa Sugar Co	6,198	9,111	8,117	9,903	3,089	8,587	7,402	6,895	7,940	6,898
Pacific Sugar Mill	3,327	4,650	4,774	4,948	2,517	6,059	3,388	4,342	4,331	2,931
Niulii Mill and Plantation	1,349	2,226	1,805	1,516	1,146	1,903	1,189	1,645	2,226	2,501
Halawa Plantation	800	1,049	1,571	1,357	575	1,860	1,016	925	1,036	1,615
Kohala Sugar Co	1,508	4,119	3,345	3,160	1,096	5,409	2,663	3,350	3,300	2,400
Union Mill Co	1,068	1,668	2,265	2,003	463	3,380	1,776	2,166	2,570	2,828
Hawi Mill	877	1,222	2,277	2,727	1,373	5,563	3,631	3,687	4,389	5,296
Beecroft Plantation	426	609	632	325	.....	.....	.....	.....	.....	.....
Kona Sugar Co	.....	.....	285	1,500	1,391	1,850	897	.....	.....	.....
Hutchinson Sugar Plan. Co	7,104	7,732	8,338	9,928	8,021	7,527	5,741	7,107	6,940	7,063
Hawaiian Agricultural Co	4,795	11,318	9,001	10,956	11,998	18,888	10,954	1,620	826	11,630
L. C. Chong—Pahala	265	839	.....	.....	.....	.....	.....	.....	.....	.....
Puakea Plantation	.....	.....	.....	145	307	366	201	262	398	400
Olaa Sugar Co	.....	.....	.....	1,150	16,748	15,030	13,788	11,361	9,405	9,431
Puna Sugar Co	.....	.....	.....	.....	2,460	3,603	3,146	3,147	867	1,172
Puako Plantation	.....	.....	.....	.....	.....	550	438	500	223	169
	91,606	117,239	115,224	134,618	121,295	170,665	122,865	126,405	137,750	143,891

10 HAWAIIAN SUGAR CROPS, 1898-1907. From September 30, 1898, to October 1, 1907.

	*Tons. 1898.	Tons. 1899.	Tons. 1900.	Tons. 1901.	Tons. 1902.	Tons. 1903.	Tons. 1904.	Tons. 1905.	Tons. 1906.	Tons. 1907.
ISLAND OF MAUI.										
Kipahulu Sugar Co.	2,250	1,931	1,890	1,992	1,427	1,622	1,415	1,324	1,464	1,809
Hamoa Plantation	1,411	2,026	2,114	1,450	1,748	.....	.....	.....	.....	.....
Hana Plantation Co., Ltd.	2,141	3,175	3,406	2,774	2,700	4,922	2,662	.....	.....	.....
Kaeleku Plantation Co., Ltd.	.....	.....	.....	.....	.....	.....	.....	2,720	850	2,702
Haiku Sugar Co.	4,648	4,865	5,512	5,488	4,234	6,397				
Maui Agricultural Co.	.....	.....	.....	.....	.....	.....	13,521	17,820	19,861	20,220
Paia Plantation	5,801	6,268	6,795	7,216	4,146	7,856				
Hawaiian Com. & Sugar Co.	15,072	16,621	17,858	22,345	19,477	33,230	29,829	39,411	43,652	44,143
Wailuku Sugar Co.	6,725	7,412	7,976	7,902	5,934	7,490	6,451	7,516	7,828	7,425
Olowalu Co.	1,425	1,502	1,480	1,240	1,055	843	1,125	1,652	1,635	1,448
Pioneer Mill Co., Ltd.	5,560	10,589	10,316	6,568	9,960	16,530	17,036	25,581	22,509	23,099
Kihei Plantation Co., Ltd.	.....	.....	.....	1,374	5,562	5,629	5,461	4,410	5,161	3,926
Maui Sugar Co.	.....	.....	.....	.....	483	257	485	.....	.....	.....
	45,033	54,389	57,347	58,349	56,726	84,776	77,985	100,434	102,960	104,772
ISLAND OF OAHU.										
Waimanalo Sugar Co.	3,004	2,352	2,932	3,045	2,985	3,218	2,963	3,428	4,148	3,186
Heeia Agricultural Co., Ltd.	2,167	2,191	2,309	1,507	631	.....	.....	.....	.....	.....
Laie Plantation	300	494	179	1,693	430	724	597	857	1,112	873
Kahuku Plantation Co.	4,356	7,008	5,647	7,072	5,623	8,212	6,360	7,431	6,689	6,500
Waialua—Halstead Bros.	2,015	.....	.....	.....	.....	.....	.....	.....	.....	.....
Waialua Agricultural Co., Ltd.	.....	.....	1,516	17,699	17,001	19,800	18,682	19,722	20,788	22,614
Waianae Co.	4,055	3,506	4,019	4,020	5,000	5,348	5,500	5,128	5,490	6,214
Ewa Plantation Co.	18,284	22,334	21,573	33,036	38,775	33,162	29,797	32,380	29,302	31,790
Apokaa Sugar Co.	.....	.....	.....	.....	901	610	874	454	865	461
Oahu Sugar Co.	.....	7,935	15,450	21,454	26,724	29,256	20,870	33,589	26,710	28,457
Honolulu Plantation Co.	.....	.....	.....	10,008	9,800	20,736	16,376	20,106	18,646	19,178
	34,181	45,820	53,625	99,534	107,870	121,066	102,019	123,095	113,750	119,273

10 HAWAIIAN SUGAR CROPS, 1898-1907. From September 30, 1898, to October 1, 1907.

ISLAND OF KAUAI.	*Tons. 1898.	Tons. 1899.	Tons. 1900.	Tons. 1901.	Tons. 1902.	Tons. 1903.	Tons. 1904.	Tons. 1905.	Tons. 1906.	Tons. 1907.
Kilauea Sugar Plantation Co.....	4,563	5,420	5,254	5,364	3,762	3,012	1,850	2,290	2,700	3,844
Makee Sugar Co.....	8,510	9,350	8,575	9,954	11,232	8,215	7,840	8,335	7,986	6,696
Hanamaulu Mill & A. S. Wilcox....	3,194	3,962	.....	.....	.....	.....	.....	.....	.....	.....
Lihue Plantation Co.....	10,914	13,333	15,289	18,356	13,674	11,375	14,611	14,185	16,005	14,127
Grove Farm Plantation.....	1,355	1,751	1,962	2,183	2,915	1,896	1,679	1,679	1,933	1,807
Koloa Sugar Co.....	4,327	5,268	5,004	5,492	5,001	4,825	6,172	6,172	5,570	5,553
A. H. Smith & Co.....	469	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eleele Plantation	1,489	.....	.....	.....	.....	.....	.....	.....	.....	.....
McBryde Sugar Co., Ltd.....	.....	1,491	1,790	2,208	9,113	11,922	10,535	13,136	11,024	7,890
Hawaiian Sugar Co.....	13,200	14,350	13,480	13,419	11,480	10,324	11,493	19,062	18,616	20,140
Gay & Robinson.....	1,600	1,821	2,001	1,554	2,265	1,645	1,665	2,151	2,099	2,590
Waimea Sugar Mill Co.....	1,026	1,021	976	919	565	540	627	1,305	1,550	1,425
Meier & Kruse.....	1,518									
Kekaha Sugar Co.....	3,480	6,942	8,287	7,412	8,978	7,064	7,447	7,318	6,626	7,329
H. P. Faye & Co.....	1,961									
Estate V. Knudsen.....	988	650	730	676	735	666	687	680	644	680
Total	58,594	65,359	63,348	67,537	69,720	61,484	64,606	76,314	74,753	72,081

	*Tons. 1898.	Tons. 1899.	Tons. 1900.	Tons. 1901.	Tons. 1902.	Tons. 1903.	Tons. 1904.	Tons. 1905.	Tons. 1906.	Tons. 1907.
ISLAND OF HAWAII	91,606	117,239	115,224	134,618	121,295	170,665	122,865	126,405	137,750	143,891
" " MAUI	45,033	54,389	57,347	58,349	56,726	84,776	77,985	100,434	102,960	104,772
" " OAHU	34,181	45,820	53,625	99,534	107,870	121,066	102,019	123,095	113,750	119,273
" " KAUAI	58,594	65,359	63,348	67,537	69,720	61,484	64,606	76,314	74,753	72,081
TOTAL	229,414	282,807	289,544	360,038	355,611	437,991	367,475	426,248	429,213	440,017

* 2000 Pounds to the Ton.

The 1908 Crop, it is estimated, will exceed 500,000 Tons.

THE HAWAIIAN PLANTERS' RECORD.

Beginning with July, the H. S. P. A. Experiment Station staff will publish, under the above name, a record of the current experiments and investigations going on at the station and observations upon island sugar matters which come to the notice of the members of the staff. This publication will take the place of circulars which have heretofore been issued by the station. It will be privately circulated only, among those connected with the Planters' Association.

VARIETIES OF CANE AND ECONOMY IN IRRIGATION.

The statement is sometimes made that a cane will never be found which will surpass the Lahaina variety on the larger part of our irrigated lands.

While Lahaina undoubtedly is an excellent cane in many particulars, there is certainly room for improvement with this variety as well as with our other island canes. If under given conditions a variety cannot be found which produces more sugar per acre than Lahaina, where both canes are allowed to make a normal growth, there is still the possibility of finding one that is more economical in its water requirements. In a test conducted by the Division of Agriculture and Chemistry, some years ago, it was found that, under the Experiment Station conditions, Lahaina cane required for its maximum growth (the average of one plant and one ratoon crop) 226 gallons of irrigation water for each pound of sugar produced; Rose Bamboo, under the same conditions, required 204 gallons per pound of sugar. This difference, which may appear small, at first thought, amounts for an eight-ton crop to 352,000 gallons per acre, and on 3,000 acres to 1,056,000,000 gallons. This large volume of water if resting on one acre of ground would have a depth of considerably over one-half mile and would take care of a crop of 200 acres of Lahaina cane. If the Lahaina variety can be supplanted by a cane which does equally well as a sugar producer but which is as economical as Rose Bamboo with respect to its needs for water, the gain is certainly a very considerable one, especially on the higher levels of an irrigated plantation. While it is not a simple matter to regulate the quantity of water applied for irrigation, by extending the intervals between irrigations with an equally good but more economical cane a very material saving in labor and water could be effected.

C. F. ECKART.

THE DETERIORATION OF SUGARS ON STORAGE.

In a bulletin published by the Division of Agriculture and Chemistry about a year ago on "The Deterioration of Sugars on Storage," an experiment was described which was undertaken "to determine the percentage of water which it is safe to leave in sugars." Separate portions of a sample of moist sugar containing fermenting organisms were dried in a vacuum so as to contain decreasing amounts of moisture from 1.86 to .29%.

The samples were polarized and put into tightly stoppered bottles. At the end of one and two months they were polarized again, and it was found that, in those samples containing more than 1% of moisture, the polarizations were lower than originally.

These samples have been recently polarized again after standing twelve months, and the results further confirm the original conclusion that raw sugars containing 1% or more of moisture are liable to deteriorate on storage. The original table with the further polarizations added is given below:

POLARIZATION.

Per cent. Moisture.	Initial.	After 1 month.	After 2 months.	After 12 months.
.29	96.8	96.7	96.7	96.5
.40	96.6	96.6	96.6	96.5
.47	96.8	96.6	96.6	96.2
.59	96.8	96.6	96.7	96.4
.65	96.4	96.4	96.6	96.2
.74	96.4	96.4	96.5	96.2
.96	96.1	96.0	96.0	95.7
1.04	96.0	95.9	95.7	95.1
1.18	96.0	95.2	95.2	94.6
1.28	95.8	95.0	95.0	94.2
1.36	95.8	95.0	94.7	94.4
1.51	95.5	94.7	94.5	93.8
1.67	95.6	94.2	94.1	93.4
1.80	95.3	93.8	94.0	92.7
1.86	95.15	94.4	94.0	93.1

Notwithstanding that the bottles were closed with rubber stoppers, the sugar was so hygroscopic that the samples had nearly all increased slightly in moisture during the year, which accounts for the lower polarizations of those containing less than 1% of moisture.

R. S. NORRIS.

A SIMPLE METHOD FOR CALCULATING THE EFFICIENCY OF MACERATION WATER.

The per cent. sucrose in bagasse is dependent on a number of factors besides the efficiency of the maceration water, and cannot therefore correctly be used as a guide in determining the efficiency.

The amount of juice in the cane, for instance, has such a marked influence on the sucrose in the bagasse that any deductions drawn from the latter in regard to the efficiency of the maceration water, even under otherwise identical conditions of milling, are liable to be entirely misleading. It is posible, for instance, to get an extraction of 93 on one day using cold water for maceration and 92.5 on another day using an equal amount of hot water, when the real efficiency of the water on the two days is the same. This, no doubt, accounts for the different and sometimes opposite opinions and usages in regard to methods of maceration.

The comparative efficiency of different methods of maceration as applied to the last mill can be determined quite satisfactorily by means of a simple formula that was first suggested several years ago by Geerligs and Ross.* They used it for comparing "the degree of admixture of the maceration water" in different factories. The formula does not, however, give the actual degree of admixture and the result varies with different amounts of water and with different pressures on the mills, even when the degrees of admixture is the same, so that it can not be legitimately used in this way: It can be properly used, however, to compare the relative efficiency of different methods of maceration at the same mill.

If it were possible to get a perfect admixture of the maceration water with the juice in the crushed cane as it reaches the last mill, we could then calculate the sucrose in the bagasse by the formula,—

$$\frac{\%\ \text{Sucrose in Last Mill Juice} \times (100 - \%\ \text{Fiber in Bagasse})}{100} = \%\ \text{Sucrose in Bagasse.}$$

With perfect admixture this should give the same results as the determination of the sucrose in the usual way. If the admixture is not perfect the last mill juice will contain a lower per cent. of sucrose than the residual juice, and the less perfect the admixture the greater will be the difference in the sucrose in the two juices. Also the smaller will be the calculated sucrose in the bagasse as compared with the per cent. determined by analysis; and the quotient of the determined per cent. sucrose in bagasse into the calculated per cent. will express roughly the per cent. efficiency of the maceration water.

The formula then for calculating the efficiency is,—

$$\frac{Sj\ (100 - Fb)}{100\ Sb}$$

* International Sugar Journal, 1900, p. 187.

in which Sj represents the per cent. sucrose in the last mill juice; Fb, the per cent. fiber in the bagasse; and Sb its per cent. sucrose. The formula cannot be used for comparing the maceration on different mills or with different amounts of water. Its value lies in its simplicity for comparing different methods of macerating on the same mill and with the same amounts of water.

R. S. NORRIS.

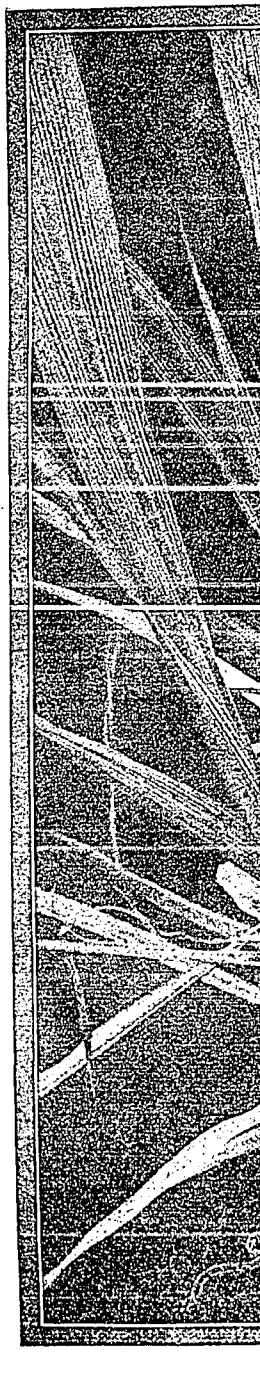
PLANTATION INSPECTIONS ON HAWAII.

In accordance with the plans of the Division of Pathology and Physiology for a regular inspection of all the plantations each year, inspections have already been made in 1909 of all the plantations on Hawaii, Maui, and Kauai.

During the months of March and April Mr. Larsen, Second Assistant Pathologist, made an inspection tour of the Hawaii plantations. Generally speaking, he found the cane in good condition from a pathological point of view and reported the injury from fungus diseases this year comparatively slight, there being no serious outbreaks of any fungus pests. Resting the land, liming, and planting to leguminous cover crops, have done much toward reducing diseases, by improving the cane as well as by destroying disease-producing organisms. Especially good results were attributed to the practice of plowing under leguminous cover crops. The practice of turning under the trash was also reported on favorably.

Root disease was reported generally over the entire island. Owing to the vigorous condition of the cane, however, and the prevalence of resistant varieties, especially Yellow Caledonia, the injury from this cause was less noticeable than it has been. With Caledonia cane it was found that while some roots of every plant, so far as could be learned, were infested with root fungus, the root production of the plants was so far in advance of the root destruction by fungi that the injury from the latter was not perceptible, except in cases where the soil conditions were so unfavorable that root production had been materialy hindered. In such cases root disease has gained a foot-hold, and the effect was marked on the appearance of the plants as well as the condition of the roots. The stellate crystal fungus was the only fungus in connection with root disease. *Ithyphallus* was never found in connection with any injury.

Eleau was found widespread over the island and was considered a serious malady in some places. It kills many young shoots and so injures those which survive that they become very subject to breakage by wind. Mr. Larsen reports this condition as following a state of lessened vitality of the young cane, brought



CANE

ALA BLIGHT.

on for any reason such as drought, prolonged wet and cold weather, lack of nourishment, shallow soil, root disease borer, etc. Early stripping was the only remedy found at all beneficial. The very erratic distribution of the affection does not favor the theory that it is caused by a parasitic fungus. The trouble is usually worse on high elevation lands, and Striped Tib cane seems to be frequently affected; but the irregular occurrence of eleau renders the collection of such data difficult and their meaning uncertain.

Rind fungus (*Melanconium sacchari*) was found everywhere on dead cane. In no instance was this fungus reported on living cane or was it ever considered the cause of death of any cane.

Red Rot was not met with on the entire trip. The Red Rot fungus (*Colletotrichum falcatum*), however, was frequently found in connection with diseased areas on the leaf sheaths.

Pineapple disease (*Theilaviopsis ethaceticus*) was not generally troublesome. Only two plantations were suffering enough from this malady to warrant mention in the reports. At one plantation pineapple disease had been decidedly injurious, and experiments on dipping the seed in Bordeaux mixture were strongly recommended.

Leaf Spots were prevalent everywhere, except in the dry district of Kau and Puako. Ring Spot and Eye Spot were the most prevalent spots, although several other unknown leaf diseases were in evidence. In many cases whole fields were markedly discolored from this cause.

While the injury from leaf spots may be slight on any one plant, the total loss is probably far greater than most people suspect. The only practical remedy would be the use of immune varieties. In his report on the disease-resisting capacity of the different seedling varieties and newer canes, Mr. Larsen found a great variation in this respect; some varieties being markedly immune to leaf troubles; thus confirming the observations made at the Experiment Station in 1907-8, and the suggestions put forward, with regard to Eye Spot in Circular No. 6 of the Division of Pathology and Physiology.

At the Hawaiian Agricultural Co. notice was taken of Pahala Blight, which is by far the most important malady at that place. Dr. Cobb's views regarding a parasitic leaf fungus as the cause of this trouble have not been subsequently substantiated. The cause was attributed to physiological disorders rather than parasites. Experiments are at present being conducted at the Experiment Station in connection with this blight.

L. LEWTON-BRAIN.

ENTRAINMENT LOSSES.

The only reference to the amount of sugar lost, in entrainment in the condenser water in evaporators and pans, that I know of in recent English sugar literature, occurs in the December, 1904, number of the PLANTERS' MONTHLY. Mr. F. Fries there describes a method he used for "trapping" a small part of the vapor coming from the pans and effects. The amount of sugar he found was so small as to be negligible. Recently the Division of Agriculture and Chemistry has had opportunity to examine the condenser water from a number of evaporators, in two of which a very considerable amount of sugar was detected.

In the first instance, the evaporator examined was a triple standard effect built in 1886; it was characterized by a low vapor space and vapor pipes of small diameter; extending over two days' work, twenty samples of condenser water, in all aggregating 2000 cc. were taken and these were evaporated down to a volume of 50 cc. The sugar in this sample was inverted and the glucose determined; determinations of the sucrose and glucose in the juice gave data to calculate the proportional amount of sucrose; from this analysis the amount of sucrose lost in condenser water was calculated as shown below. In this instance the determination indicated a loss of 2% of the sugar entering the boiling house.

In the second case only one sample of 2000 cc. was taken; this was evaporated to 100 cc. and the sugar present determined by the polariscope; this one trial indicated a loss of 1.5% of the sugar entering the boiling house.

In two other instances in other factories no loss was detected.

Method of Calculation.—This can best be shown by an example using the data as given below:

Density of juice entering evaporator.....15° Brix
Density of syrup leaving evaporator.....55° Brix
Sugar in juice = 14%.

Two thousand cc. of condenser water evaporated to 50 cc. gave a reading of 2.95 in the 20 cm. tube; the condenser water hence contains .01917% sugar.

Vacuum in last (third) body..... 26 ins.,
whence temperature of vapor.....133° F.
Temperature of condenser discharge.....115° F.
Temperature of condenser intake..... 80° F.

The evaporation in the triple is per 100 juice entering $100 \times \frac{55-15}{55} = 72.73\%$, of which, with no great error, it is allowable to suppose that one-third, or 24.24%, is evaporated in the last body.

One pound of vapor at 133° F. condensing to water at the same temperature gives up 1022 British thermal units, and in cooling down to 115° F. gives up an additional 18 units, a total of 1040 units; each pound of injection water raised from 80° F. to 115° F. takes up 35 units, so that for every pound of vapor there have been used 1040÷35, or = 29.71 pounds of injection water. The total weight of condenser water is then 30.71 pounds for every pound of vapor; since the vapor given off from the last body is 24.24% of the weight of the juice, then for every pound of juice there are 30.71x24.24=7.44 pounds of injection water.

The condenser water contains .01917% sugar and hence referred to juice indicates a loss of .01917x7.44 on 14, or 1.02% of the sugar entering the evaporator.

Causes of Entrainment Losses.—Sugar is carried over into the condenser of pans and effect through two distinct causes:

1. By splashing.
2. By vesicular transference.

By splashing is meant the mechanical projection upwards of a drop of liquid; and by vesicular transference, the carrying upwards of a hollow bubble of liquid.

The fundamental equation giving the height to which a drop or vescicle of liquid will reach is given by the expression*

$$h = \frac{C^2}{2g\left[1 - \frac{P + P'}{2W}\right]}$$

when h is the height reached; C is the velocity with which the drop or vesicle leaves the surface of the liquid; g is the acceleration due to gravity; P is the pressure exerted on the drop due to the current of steam at its lowest point; P′ that at the highest point; and W is the weight of the drop.

From this equation it follows that the height to which drops reach depends:

1. On their initial velocity.
2. On the pressure exerted on them by the current of steam.
3. On their weight.

Initial Velocity.—A bubble of steam formed at the lower end of a tube travels upwards with constantly increasing velocity, and hence with long tubes the initial velocity is greater than with short tubes; hence vessels with short tubes will tend to give a less loss in entrainment than those with longer tubes.

Pressure Exerted by the Steam.—The pressure exerted by the steam on a drop increases with the square of its velocity and also with the pressure under which the steam exists; hence the tendency to carry forward drops of liquid is greater in vessels of small diameter and in small vapor pipes than it is in vessels of larger

* Hansbrand. Evaporating, Condensing and Cooling Apparatus.

diameter and with more ample vapor pipes; as regards vessels, there is a greater pressure in the earlier ones and less velocity; in any case, increasing the diameter of a vessel, a result which would follow from the use of shorter tubes, would decrease the velocity and tend to lessen entrainment losses.

Weight of Liquid.—The weight of a vesicle or bubble of liquid being so much less than that of a drop, indicates that it is to vesicular transference that the greater part of entrainment losses are due; in the earlier bodies, although the liquid therein contained is specifically lighter than in the later ones, yet, owing to the viscosity of the denser juice, the tendency to form vesicles i so much increased that it is in the last body that entrainment losses become serious.

Prevention of Entrainment Losses.—Losses due to splashing are prevented by a regard to the factors influencing the velocity already described and by the use of vapor space of ample heigh above the tube plate. Losses due to vesicular transference ar much harder to control, since the bubble may be so light that the influence of the forward current of vapor is enough to overcome the force of gravity. To prevent this loss a number of appliances have been devised.

The original and best known type is the Hodek Ralentisseur; this consists of a chamber inserted in a vapor pipe; in this chamber are arranged a number of transverse perforated partitions, the sum of the areas of the perforations being greater than the area of the vapor pipe. It has been found by experience that this appliance is very effective in preventing vesicular transference. Its action is probably two-fold; the vesicles on striking on the solid parts of the partitions are mechanically ruptured and forming drops now no longer are carried forward, but fall down; and secondly, the sudden change in the area of the pipe reduces the pressure acting on the vesicle whereby the latter bursts into drop which fall down and no longer are carried forward. Many modifications of the Hodek have been devised; they are in common use in Europe and also in Mauritius where it is exceptional to find an evaporator without them.

In some cases the diaphragms are dispensed with entirely s that the useful effect is entirely due to the suddenly decreased pressure causing the bubble to burst.

According to Horsin Deon the best proportions for a Ralentisseur are that the diameter be 3 to 3½ times, and the length be 6 times the diameter of the vapor pipe in which they are inserted.

This short account of the principles under which entrainment losses occur is given in view of the fact that two evaporators out of four examined showed a serious loss in entrainment; for a detailed discussion reference should be made to Hansbrand's *Evaporating, Condensing, and Cooling Apparatus.*

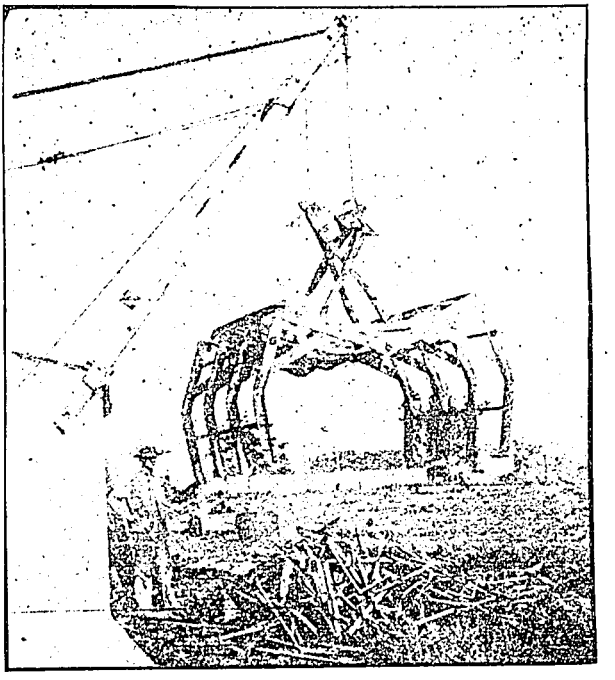
NOEL DEERR.

LABOR SAVING DEVICES—CANE LOADERS.

GAUSSIRAN'S CANE GRAB.

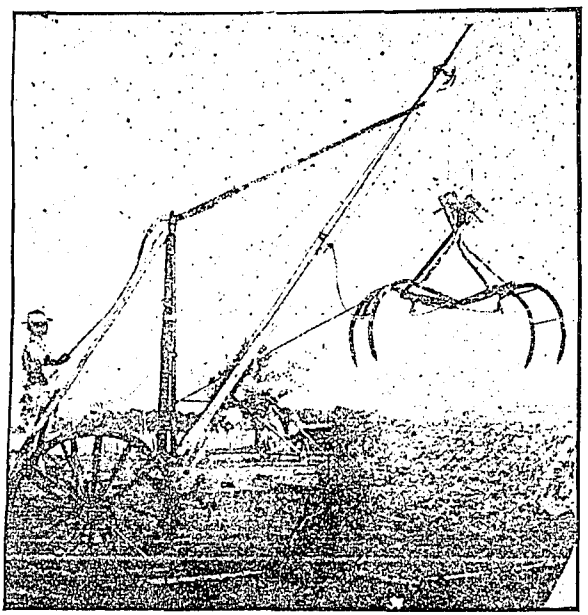
Louisiana Planter.

Among the labor saving devices that have come into conspicuous use within a few years has been the cane grab, a grapple invented to pick canes off the ground and transfer them to cane carriers, or transfer them to waiting cars, or to pick up broken bundles or scattering cane from the ground in the cleaning up of cane yards. The well known inventor, Mr. Jules Gaussiran, of Baldwin, La., has brought out a cane grab that will lift anywhere from one to three tons of cane at a single lift, picking it up clean from the ground and transferring it anywhere within the radius of the derrick to which it may be attached. Mr. Gaussiran's cane grabs involve some of the principles of the orange peel bucket so generally used these days in dredging. As the grab descends it reaches the ground at its fullest spread. The force then applied to the grab pulls the grappling points upward just as does the



LARGE GRAB FOR CANE YARD OR LOADING STATION.

first pull on the parts of the orange peel dredge bucket. The grab, or crapple, in this way secures a full load of cane, or as much as may be available, before it begins to rise. These grabs can be made very small or very large and can be used in field loading devices, with horse power or gasoline engine, and can be made of any size desired for large loads and for unloading boats or standard gauge railway cars. Mr. Gaussiron will be glad to give any desired particulars as to the capacity of the grabs, their weight, price, etc. The illustrations given herewith indicate the one the small grab for cane loading in the field and the other a



SMALL GRAB FOR LOADING CANE IN THE FIELD.

larger grab for cane yard use, or for transfer use at loading stations. The subjoined testimonials from well known sugar planters indicate their approving judgment as to the intrinsic merit of Mr. Gaussiran's device.

They read as follows:

Irish Bend, St. Mary's Parish, La., Nov. 21, 1907.

Jules Gaussiran, Esq.:

Dear Sir:—Please find enclosed our check in payment of the grab which you furnished us last week. We have put the grab to severe tests both for picking up scattered and broken loads of cane in the barges and also the same on the yard, and we will

cheerfully recommend it as a great labor saver at any sugar house and an implement that will pay for itself many times over during a grinding. Yours truly,

OAK BLUFF PLTG. & MNFG. CO., LTD.,
Per W. R. Collins.

Oliver, La., May 21, 1909.

Mr. Jules Gaussiran, Baldwin, La.:

Dear Sir:—After witnessing the practical demonstration of your cane grab in Baldwin a few days ago, the writer has decided to place an order for a small grab to unload barges at the Orange Grove Factory. As our present American Hoist Derrick on Bayou Teche is of light construction, I prefer a grab that will not weigh over 1,200 pounds and will handle about a ton of cane, and would suggest the following dimensions: 5½ feet wide when open and 6 feet long.

The feature of your device which appeals to me most is the fact that it can be operated by one wire and easily tripped by any ordinary workman. I trust you will use only the very best material in the construction of the grab and that it will be entirely successful.

Yours truly,
H. N. PHARR.

THE SUGAR TRUST INDICTED.

The Federal Grand Jury in New York has found indictments against the American Sugar Refinery Company (the Sugar Trust) and eight individuals for a violation of the criminal clause of the Sherman Anti-Trust Law in connection with the loan to Mr. Adolph Segal, of the Pennsylvania Sugar Company. The individuals who are indicted are Mr. John E. Parsons, for many years chief counsel and a director of the Sugar Company; Mr. Washington B. Thomas, the President; Mr. Arthur Donner, the Treasurer, and Mr. Charles H. Senff, Mr. John Mayer, and Mr. George H. Frazier, directors of the Company; Mr. Thomas B. Harned, counsel for Segal when the loan was made; and Mr. Gustave E. Kissel, who acted as agent for the Company in making the loan. The indictments charge that the defendants were guilty of various acts constituting a conspiracy in restraint of trade. These acts consisted in lending to Mr. Segal, through Mr.

Kissel, a million and a quarter dollars, and thereby securing such control of his Pennsylvania Sugar Company and its newly erected refinery as enabled them to keep the refinery from opening, and so to eliminate its possible competition.

NEW FOREST RESERVES.

The month of May, 1909, saw several forest reserve projects brought to the point of completion. The new reserves are as follows:

1. The "Mauna Kea Forest Reserve," 66,600 acres, all government land, in the District of Hamakua, Island of Hawaii, embracing the summit and upper slopes of Mauna Kea;

2. The "Waihou Spring Forest Reserve," in the District of Hamakuapoko, Island of Maui, surrounding the Waihou Spring on the western slope of Mt. Haleakala, a total area of 84 acres, of which 74 is government land;

3. The "Lihue-Koloa Forest Reserve," in the Districts of Puna and Kona, on the Island of Kauai, a total area of 29,260 acres, of which 12,945, or 44 per cent., is government land;

4. The "Moloaa Forest Reserve," in the District of Koolau, also on Kauai, 5,670 acres, of which 3,615, or 64 per cent., belongs to the government;

5. And a modification of the boundary of the Makawao Forest Reserve, in the District of Hamakuapoko, Maui, whereby the area of that reserve is increased from 1,796 to 1,830 acres.

The creation of these new reserves on Kauai completes the chain around the main mountain on that island, bringing Kauai to a point where forest management can be effectively applied when it becomes possible to undertake systematic forest administration.

The previously set apart forest reserves are 16 in number, with a total area of 444,116 acres, of which 61 per cent., or 273,912 acres, is government land.

The five new reserves contain a total area of 101,648 acres, making a total area now reserved of 545,764 acres, of which 357,180 is government land.

It may be thought by those who do not know the facts that the government is locking up too large a proportion of the public lands in forest reserves. As a matter of fact this is not so. For example: The "Mauna Kea Reserve" set apart in May, covers 66,600 acres, which is a very large area for Hawaii. The reserve covers, however, the top and upper slopes of Mauna Kea, at an elevation of from 8,000 to 13,700 feet, above the line of cultivation and above the line, in great part, of grazing lands even.

It has been the practice in the past, in leasing government land for cultivation or pasturage purposes, to include all of the waste

land, or land unfit for the direct purposes of the lessee. The present policy is to reserve the portions of the lands that are not to be put into direct use, and, if they are appropriately located, to put them into forest reserves. The Mauna Kea Forest now contains a comparatively small area of woods; but the terms of the leases of adjacent government land require the lessees to keep the reserve fenced. With the exclusion of stock it is expected that the native mamane forest will increase, and if experiments with coniferous trees are successful, this area, which has a climate similar to that of the Pacific Coast, may eventually become an important source of lumber supply.

AN IMPORTANT FORESTRY EXPERIMENT.

By coöperation between the Federal Forestry Department, the Territorial Board of Forestry and the Haleakala Ranch Co., a most important forest experiment is now being carried on, on the upper slopes of Haleakala.

There are four mountains in the Islands with a height of 8,000 feet and upward, the area, above that elevation aggregating not less than 200,000 acres. Snow falls on all four of these mountains, and is perpetual on two of them. Frosts occur in winter, and generally the climate is too severe for the native tropical trees. It is, however, as cold as the mountainous region of the Rocky Mountains and the Pacific Coast ranges, where pines and other valuable timber trees grow to perfection. There does not seem to be any good reason why such trees, if once introduced and established, should not do well and become self-propagating, bringing this vast semi-barren area, or at least a large part of it, into a valuable forest.

The suggestion that this be done was presented to the National Forest Department some time since, and its coöperation requested. It has now authorized the expenditure of $2,000 for the purpose, the work to be carried on under the supervision of the Territorial Board of Forestry.

The Haleakala Ranch Company has volunteered to furnish all the land desired for the experiment.

About 1,000 young coniferous trees have been sent down from a nursery in California, and have been planted out at three elevations on Haleakala, extending from about 6,000 to 9,000 feet elevation. The trees have been successfully set out, and most of them appear to be doing well. The progress of the experiment will be watched with the greatest interest.

THE COFFEE MARKET.

The world's visible supply for July 1st will stand at about 12,500,000 bags, which means a decrease of nearly 4,000,000 bags in two years. While production in that time has been below normal, the steady increase of consumption is very apparent.

Recent cables from Rio reported the new crop damaged ten per cent. by rain, while in December last the reports were that the crop had been damaged at that time ten per cent. through extreme drought. Considering that the new crop is commenced without any remnants left over from the old crop, it is certainly doubtful if under these conditions, the export of the Rio crop should exceed three and a half millions.

The reports from Santos remain unchanged. New crop receipts which have been coming in for more than two weeks, are so far of small bean and poor quality. But this is likely to improve in course of time, as, generally speaking, the crop is expected to be good quality.

With Rio and Santos stock of about 1,000,000 taken out of the world's visible, the supplies in consuming markets are 11,500,000 bags, of which 7,000,000 bags are controlled by the San Paulo Bond transaction and not at the disposal of the trade. The quantity left available for consumption, 4,500,000 bags, is not enough for consuming purposes at these prices, for the reason that such a small percentage of it is good quality or desirable. In the United States the amount of Santos coffee at the disposal of the trade is very small, and will have to suffice for about two months as it will be fully that time before desirable qualities in appreciable quantities can reach our markets.—Willett & Gray, July 1.

SUGAR BEETS AND BEET SUGAR.

There are now 64 active beet-sugar factories in this country located in 16 different States. Last year the farmers of these States harvested about 365,000 acres of beets, and delivered to the factories 3,415,000 tons of beets. From these nearly 3,426,000 tons of refined sugar was made. The yield of beets per acre was 9⅓ tons, and the yield of sugar per acre of beets was 2,234 pounds.

The U. S. Department of Agriculture has just issued its annual report on "Progress of the Beet Sugar Industry in 1908." One marked feature of progress is seen in the improved quality of the beets grown. The entire beet crop for 1908 averaged 15¾ per cent. of sugar in the beets. The factory processes have also been improved until the refined sugar is about four-fifths of that contained in the beets.

One of the instructive features of this report is an account of the use of by-products. The beet pulp from which the sugar has been extracted is a valuable stock food, and vast quantities of it are fed in the fresh state to cattle and sheep. It finds especial favor with dairymen. A dozen or more factories have installed plants for drying pulp. With this is mixed molasses, the product being put on the market as "dried-molasses-beet pulp." The molasses is also extensively used in the manuacture of alcohol.

The prospects for further development of the industry are reported to be good. Plans are on foot for the building of several new factories.—American Grocer.

PERCENTAGE OF SUGAR EXTRACTED FROM THE BEETS IN GERMANY, AUSTRIA AND FRANCE.

During the period 1904-1908, the yield, estimated in refined sugar per hundredweight of beets has been:

Seasons.	Germany.	Austria.	France.
1904-05	13.42	12.78	11.84
1905-06	13.23	13.95	11.51
1906-07	13.47	13.32	12.28
1907-08	13.43	14.97	11.83
Average	13.39	13.74	11.86

For Germany and Austria, where mostly raw sugar is extracted, the above figures for the yield in refined sugar are calculated, as usual, at the rate of 90 lbs. of refined for 100 lbs. of raw sugar.

For France, the yield is the weight of refined sugar corresponding exactly to the quantity of raw or refined sugar extracted at the centrifugals.

It appears that 100 lbs. of beets in France are yielding 1.53 per cent. less sugar than in Germany, and 1.88 less than in Austria.

In 1907-08, the yield in Austria has reached the unprecedented figure of 16.6 per cent. in raw sugar, corresponding to 14.94 per cent. in refined. In Bohemia, the average extraction in raw sugar has been 17 per cent., and 15.3 per cent. in refined sugar.—*Journal des Fabricants de Sucre.*

ESTABLISHMENT AND WORKING OF THE SUGAR INDUSTRY AGRICULTURAL BANK AT BARBADOS.

By the Hon. F. J. Clarke,

President of Barbados Agricultural Society.

In giving a short account of the establishment and working of the Sugar Industry Agricultural Bank, it will be interesting to trace the steps that have been taken from time to time to enable planters in this island to obtain advances for carrying on the working of their plantations. As long as sugar brought a good price, and there was a good margin of profit, there was practically no difficulty in obtaining advances, but with the drop in the price of sugar in 1884, there were many whose estates were encumbered who found themselves in difficulties. As owners of encumbered estates they could not pledge the crops for advances, and no one was willing to take the risk of advancing against the crops of encumbered estates, as the lien holders might foreclose before the reaping and sale of the crops.

In July, 1885, Sir W. Robinson, who was then Governor, in a Minute to the Colonial Secretary, stated that he had been informed that certain planters were unable to obtain a supply of necessaries for cultivation during that season without temporary assistance, and that he would be glad to have some reliable information as to whether this was true, and suggested that a joint Committee of both Houses of the Legislature be appointed to enquire into and report on the matter; and that were it true, the Committee would doubtless consider the propriety of passing a temporary enactment giving preference to charges of the next crop for cultivation advances within certain limits. This Minute was laid before the House of Assembly and the joint Committee was appointed.

They reported to this effect:

That the owners of plantations in this island may be divided into three classes, as follows:

1. Those who cannot be said to need assistance.
2. Those who are quite insolvent and could not be judiciously assisted.
3. An intermediate class; but the Committee could not agree as to whether this was a large or a small class.

And that they were not in favor of recommending any such legislation as that suggested by His Excellency.

A member of the House gave notice of his intention to move the House into Committee on some future day to discuss the general question embodied in the report. At a subsequent meeting he moved that the House go into Committee to consider the question of raising a sum not exceeding £100,000 to assist planters to

bring their crops to maturity. This motion was very fully discussed, but was lost.

The difficulties of planters increased meanwhile, and in the following year, 1886, an Act was passed entitled "an Act to enable sugar plantations to be cultivated and managed for a limited period," and was generaly known as the Plantations-in-aid Act, 1886. It was to remain in force for one year. It provided for a Government guarantee of advances against the crops of the following year.

Three Commissioners were to be appointed by the Governor-in-Executive Committee, whose duties were to determine what advances should be made to each person applying, to see that the money advanced was properly expended, and that the proceeds of the crops against which advances had been obtained were handed over to the persons making the advances. Any unpaid balance was to be a charge against future crops, and at the back of all was the Government guarantee. Proceedings in the Court of Chancery did not affect the security given by the Act over the crops against which advances had been made.

The Secretary of State for the Colonies did not approve of the revenues of the island being pledged for the purposes of the Act, but, considering the circumstances under which it had been passed, he said he would not advise Her Majesty to disallow it. This Act never came into operation. The troubles of planters were increasing at a rapid rate and many plantations were thrown into Chancery. And in the following year, 1887, another attempt was made to solve the difficulty by the passing of the Agricultural Aids Act. This Act provides that owners may obtain advances on the security of their crops. Owners intending to obtain advances must advertise their intention to do so, and if within a certain time the lien holders do not object, they may do so under the provision of the Act. The security over the crops, which they are thereby empowered to give, is not affected by a foreclosure suit. Future crops are not liable for unpaid balances. The security is over the one year's crops pledged, and those alone.

This Act, which is still in operation, enabled planters to carry on with more or less difficulty according to the seasons until the severe crisis in 1902. Early in that year planters were informed by those who had been making them advances under this Act, that they were not prepared to make any further advances owing to the very hopeless outlook for the sugar industry. Strong representations were made to Mr. Chamberlain as to the perilous state of the sugar industry in the West Indies and British Guiana, and he got a free grant of £250,000 from the British Government to assist planters in tiding over the time that should elapse before the abolition of the bounties on beet sugar. The share of the grant allotted to the Barbados was £80,000.

It was very wisely decided not to divide it up between the sugar growers, but to use it for the purpose of enabling the Gov-

ernment to make advances to them, to assist in carrying on the cultivation of their plantations.

To give effect to this wise decision an Act was passed entitled the Plantations-in-Aid Act, 1902. The £80,000 was placed under the control of the Governor-in-Executive Committee. The Act provides that the Executive Committee borrow a sum not exceeding £200,000 at 5 per cent., on the security of the revenues of the island, to be repaid on August 31, 1903. The grant of £80,000 was to be used for the repayment of the money so borrowed. Five Commissioners were appointed, whose duty it was to receive applications for loans, and to recommend to the Executive Committee to whom loans should be made and the amount of such loans, to see to the proper application of the loans and their repayment. The loans were a speciality debt, the first lien against the plantation and against the crops and stock, and interest at the rate of 5 per cent. was charged on the loans.

The proceeds of the crops were to be paid to the Executive Committee, and if they were insufficient to repay the loan, the balance was to be repaid by five annual installments with interest.

The owner before borrowing had to obtain the consent of the lien holders against his plantation, or put an advertisement in the Official Gazette and one daily newspaper of his intention to borrow.

Planters gladly availed themselves of this means of getting money to work their plantations, and loans to the amount of £96,041 were obtained by 122 planters for this purpose.

The Act was renewed in 1903, and 137 owners borrowed £151,806.

The Act was again renewed in 1904, and 109 owners borrowed £114,915.

In 1905, the Act was again renewed, but the provisions pledging the revenues of the island for the amount borrowed was omitted, and the loans to planters were made re-payable in four years at the request of the Secretary of State, who in his Despatch on the subject said that, if the Act were to be renewed again, the period of repayment must be further curtailed, viz., from four years to three years, and from three years to two years, and so on, so that all the loans may be repaid at latest in 1909. In 1905, 102 owners borrowed £99,807.

In 1906, the Act was again renewed for one year, and 98 owners borrowed £112,540. As the time was approaching when the operations of these Acts would cease, and as it was necessary to devise some other scheme by which the £80,000 could be used for the same purpose, a Committee was appointed by the Legislature to inquire into and report on the matter, and to recommend a scheme to take the place of the Planters-in-Aid Act when the same should expire in 1907. The Committee carefully considered the question, and by way of report handed in a bill providing for the establishment of an Agricultural Bank. This bill

was approved of by the Executive Committee and was passed by the Legislature, becoming the "Sugar Industry Agricultural Bank Act, 1907." In the preamble it is stated, and whereas the system of making advances for sugar cultivation, which has been in force since 1902 under the aforesaid Plantations-in-Aid Acts appears to be best calculated to promote the collective and permanent interest of the sugar industry, and it is desired to place that system on a permanent footing by transferring the free grant of £80,000 made to the Barbados sugar industry in 1902 with accrued interest, and the securities therefor, to a Sugar Industry Agricultural Bank to be established for the purpose of continuing such advances to sugar producers.

The Act provides for the formation of the Bank.

The Colonial Secretary, one person to be appointed by the Legislative Council, four persons to be appointed by the House of Assembly, and one person to be appointed by the Agricultural Society are made a body politic and corporate under the name of "The Sugar Industry Agricultural Bank." These persons are called the members of the Bank. The Colonial Secretary is the Chairman.

The grant of £80,000 and all accretions of interest which amounted to £16,360 5s. 8d., and all securities for amounts still due by plantations are vested absolutely in the Bank.

All the provisions respecting the making of loans, the expenditures and re-payment thereof, are the same as those of the Acts prior to the Act establishing the Bank.

All unpaid balances of advances against a crop are made repayable in five annual installments with interest.

The Bank takes the business of advancing to planters out of the hands of the Executive Committee, thereby putting an end to all Government connection with this business. Since the establishment of the Bank early last year, it has lent £68,443 to 93 sugar producers.

When the Bank took over this business there were £13,980 due for advances made in 1902 against the crop of 1903—a short crop with low prices; £263 due for those of 1903 against the crop of 1904, £487 due for those of 1905, and £938 for those of 1905 against the crop of 1906. These balances are being gradually paid off.

The only loss was in 1903, and that amounted to the insignificant sum of £250.

Planters were enabled to pass through the severe crisis of 1902, and those who have chosen to do so, have continued to work their plantations by availing themselves of the opportunities afforded by the Bank for obtaining advances. But for the timely aid rendered by the grant of £80,000 and the passing of the Plantations-in-Aid Act of 1902, there would have been a state of things in this island which one dreads to contemplate.

As will be seen from the short account I have given, this is not an Agricultural Bank in the sense in which institutions in Germany and other parts of the world are known as Agricultural Banks, but it has suited the conditions surrounding the sugar industry in this island, and I venture to predict a career of usefulness and prosperity.

DISCUSSION.

Mr. J. H. Collens (Trinidad) said that this Bank seemed to have been established upon quite a different principle to the Raiffeisen banks in Europe, and would seem to be intended to benefit only one class of persons, namely, the sugar planters who had not sufficient funds of their own to bring their crops to maturity. In Trinidad and some of the other islands an Agricultural Bank would have to be of a more general character. He should like to know on what basis they went in determining the amount of loan to be advanced to any particular planter, and whether the loans could be extended to other industries.

Hon. F. J. Clarke explained that the sugar industry was in Barbados, and the Imperial Grant of £80,000 was given to sugar growers, and it was specially stipulated that it was to be used for the permanent and collective benefit of the sugar industry. Applications for advances were sent to the Directors of the Bank, and they decided how much should be lent to each particular planter. The planter made a return of the amount of crop he intended to cultivate, the acreage of his plantation, and so on, and the Directors of the Bank decided what loan it would be safe to make on the crop and plantation, basing their decision on the number of acres of land and so on.

With regard to making advances to other than sugar producers, the members of the Bank tried to be as liberal as possible. If a planter wanted advances on what was practically a cotton plantation, they insisted that he must also have some sugar cane growing, so as to come within the four corners of the Act. It did not matter what was the area he had planted in canes. He might have a plantation containing fifty acres of land, of which forty-nine acres were planted in cotton and one acre in sugar. That would meet the requirements and justify a loan.—West Indian Bulletin, Vol. IX, No. 2.

COTTON PRODUCTION IN 1908.

The revised figures of the cotton crop of the United States for 1908 show a total production, including linters, of 18,537,306 bales, counting 500 pounds to a bale. This is an increase over the production of 1907 of 2,211,845 bales, or 19.4 per cent. It is the third largest crop ever produced, being exceeded only by the

crops of 1904 and 1906, and is nearly one million bales larger than the average crop of the last five years.

The estimated quantity of cottonseed yielded by the crop of 1908 was 5,903,838 tons, of which 3,669,747 tons were treated by oil mills, affording products valued at $86,092,583. The quantity of these various products was: Oil, 146,789,880 gallons; cake and meal, 1,491,752 tons; hulls, 1,330,283 tons, and linters, 165,138,628 pounds.

In spite of the foregoing yields, the demand for cotton is increasing faster than the supply, and the indications are that before many years are passed, the United States will have no raw cotton for export.

WAGES PAID ON SUGAR PLANTATIONS IN EUROPE.

The agitation upon the subject of sugar plantation wages, and the demand that they be forthwith increased naturally draws attention to the rate of wages paid elsewhere for similar services.

A report on the European sugar industry presented to the Ways and Means Committee of the United States Congress, in connection with the tariff bill now before Congress, gives a schedule of wages, in United States currency, paid by sugar plantations in Germany, Austria and France, from which we make the following extracts:

FRANCE.—Ordinary labor in sugar factories, from 58 to 73 cents per day, equal to from $15.08 to $18.98 per month of 26 days.

GERMANY.—Sugar factory laborers: Women, 48 cents per day, equal to $12.48 per month; men, 60 to 72 cents per day, equal to $15.60 to $18.72 per month of 26 days.

Agricultural laborers, hours from 4 a. m. to 9 p. m., 17 hours, less time for meals: Men, 42 cents per day, equal to $10.92 per month; women, 26½ cents per day, equal to $6.89 per month. These laborers also received lodgings, coffee and one meal per day.

HUNGARY.—Sugar factory laborers, 40 to 60 cents per day, equal to $10.40 to $15.60 per month.

AUSTRIA.—Agricultural laborers: Women, 12 to 15 cents per day, equal to $3.12 to $3.90 per month of 26 days. Men, 20 to 24 cents per day, equal to $5.20 to $6.24 per month. "Men on piece work, working from 4 a. m. to 8 or 9 p. m., are able to earn from 60 to 70 cents per day." Common labor in the sugar factories is paid from 25 to 35 cents per day.

SUGAR PRODUCTION AND CONSUMPTION STATISTICS.

American Beet Sugar Gazette.

PRODUCTION IN CONTINENTAL UNITED STATES.*a*

Year.	Cane. *Pounds.*	Beets. *Pounds.*	Total. Production. *Pounds.*
1887	191,282,272	1,792,000	193,074,272
1888	375,904,197	571,200	376,475,397
1889	344,756,221	4,168,640	348,924,861
1890	305,766,271	4,934,720	310,700,991
1891	497,169,856	7,778,160	504,918,016
1892	370,579,307	11,997,440	382,576,747
1893	463,268,627	26,920,320	490,188,947
1894	610,825,618	44,688,000	655,513,618
1895	729,392,561	45,006,080	774,398,641
1896	543,633,726	65,452,800	609,086,526
1897	644,175,323	84,080,640	728,255,963
1898	707,951,878	90,491,520	798,443,398
1899	557,657,417	72,735,040	630,392,457
1900	334,187,832	163,394,560	497,582,392
1901	612,034,090	172,164,160	784,198,250
1902	728,650,448	369,212,480	1,097,862,928
1903	745,805,875	346,311,680	1,182,117,555
1904	517,624,414	481,208,000	998,832,414
1905	784,000,000	484,227,520	1,268,227,520
1906	766,080,000	625,840,320	1,391,920,320
1907	544,320,000	967,223,040	1,511,543,040

BROUGHT FROM THE ISLANDS NOW DESIGNATED AS NONCONTIGUOUS TERRITORIES OF THE UNITED STATES.

Year.	From Porto Rico. *Pounds.*	From Hawaii. *Pounds.*	From Philippine Islands. *Pounds.*	Total. from Islands. *Pounds.*
1887	131,443,622	218,290,835	246,168,994	595,903,451
1888	115,654,059	228,540,513	274,809,392	619,003,964
1889	81,340,747	243,324,683	186,151,600	510,817,030
1890	76,926,934	224,457,011	259,775,540	561,159,485
1891	80,013,652	312,255,016	920,610,118	484,878,786
1892	80,474,547	262,612,405	97,285,662	440,372,614
1893	99,617,911	289,553,529	122,413,780	511,585,220
1894	75,546,030	326,574,584	124,052,343	526,172,957
1895	56,352,954	274,385,228	68,770,492	399,508,674
1896	81,582,810	352,175,269	145,075,344	578,833,423
1897	86,607,317	431,217,116	72,463,577	590,288,010
1898	98,452,420	499,776,895	29,489,600	627,718,915
1899	107,208,014	462,423,600	51,625,280	621,256,894
1900	72,558,181	504,713,105	49,490,542	626,761,828
1901	137,201,828	690,877,934	4,693,333	832,773,095
1902	183,817,049	720,553,357	11,424,000	915,794,406
1903	226,143,508	774,825,420	18,773,333	1,019,742,261
1904	259,231,607	736,491,992	61,570,614	1,057,294,213
1905	271,319,993	832,721,387	77,997,424	1,182,038,804
1906	410,544,619	746,602,637	69,373,602	1,226,520,857
1907	408,149,992	821,014,811	25,164,756	1,254,329,559

IMPORTED FROM FOREIGN COUNTRIES OTHER THAN PORTO RICO, HAWAII, AND THE PHILIPPINES.*b*

Year.	Beet.	CANE		Total.
		From Cuba.	From other Countries.	
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1887	*d* 240,786,727	1,394,716,316	905,036,746	2,540,539,789
1888	61,949,752	1,209,174,819	810,155,747	2,081,280,318
1889	243,473,321	1,032,085,602	975,827,014	2,251,385,937
1890	601,119,476	1,041,075,621	731,656,978	2,373,852,075
1891	658,994,380	1,430,566,475	909,037,581	2,998,598,436
1892	293,134,261	1,983,540,022	839,462,268	3,116,136,551
1893	436,333,843	1,843,652,253	974,874,031	3,254,860,127
1894	510,350,276	2,127,502,319	1,181,168,329	3,819,020,924
1895	347,376,732	1,845,763,398	981,861,650	3,175,001,780
1896	064,686,985	1,093,171,312	1,619,646,837	3,317,505,134
1897	1,865,577,495	577,790,173	1,885,250,055	4,328,617,723
1898	140,641,485	440,225,111	1,481,335,340	2,062,201,036
1899	723,336,352	663,543,657	1,972,113,666	3,358,993,675
1900	701,539,452	705,456,230	1,984,329,020	3,391,324,702
1901	908,683,078	1,099,404,363	1,962,225,066	3,970,312,507
1902	255,030,219	984,216,925	1,781,244,731	3,020,491,875
1903	87,130,805	2,396,497,779	1,713,706,189	4,197,334,773
1904	2,414,454	2,819,558,402	817,080,143	3,639,052,999
1905	223,944,976	2,057,684,169	1,321,306,429	3,602,935,574
1906	48,458,919	2,781,901,380	1,079,507,529	3,909,957,828
1907	397,745,046	3,236,466,419	732,463,754	4,366,675,219

IMPORTED FROM EUROPE, BEET SUGAR NOT BEING SEPARATELY SPECIFIED.

Year.	Exported from the United States.*b*	Consumption in United States (continental).
	Pounds.	*Pounds.*
1887	204,241,167	3,125,276,345
1888	60,399,496	3,016,360,183
1889	19,751,597	3,091,376,231
1890	47,495,577	3,197,216,974
1891	113,051,117	3,875,344,121
1892	19,414,620	3,919,671,292
1893	29,232,282	4,227,402,012
1894	64,324,539	4,936,382,960
1895	27,234,732	4,321,674,363
1896	10,743,185	4,494,681,898
1897	48,770,668	5,598,391,028
1898	19,927,465	3,468,436,784
1899	16,964,213	4,593,678,813
1900	26,918,380	4,488,750,542
1901	14,015,102	5,573,097,109
1902	15,175,805	5,018,902,674
1903	19,529,092	6,379,599,669
1904	41,607,988	5,653,488,542
1905	27,428,446	6,025,773,452
1906	37,105,110	6,491,293,895
1907	42,879,843	7,089,667,975

Year	Percentage of cousumption supplied by — Domestic	Noncontiguous territory	Foreign countries	Per capita consumption in United States	Raw centrifugal	Prices at New York Granulated refined
				Pounds.	*Cents.*	*Cents.*
1887	6.2	19.1	74.7	53.36	5.38	6.02
1888	12.5	20.5	67.0	50.29	5.93	7.18
1889	11.3	16.5	72.2	50.44	6.57	7.89
1890	9.7	17.5	72.8	51.06	5.57	6.27
1891	13.0	9.0	78.0	60.70	3.92	4.65
1892	9.8	11.2	79.0	60.22	3.32	4.35
1893	11.6	12.1	76.3	63.71	3.69	4.84
1894	13.3	10.7	76.0	72.99	3.34	4.12
1895	17.9	9.2	72.9	62.69	3.23	4.12
1896	13.6	12.9	73.5	63.98	3.62	4.53
1897	13.0	10.5	76.5	78.20	3.56	4.50
1898	23.0	18.1	58.9	47.55	4.24	4.97
1899	13.7	13.5	72.8	61.81	4.42	4.92
1900	11.1	14.0	74.9	58.83	4.57	5.32
1901	14.1	15.0	70.9	71.77	4.05	5.05
1902	21.9	18.3	59.8	63,53	3.54	4.46
1903	18.5	15.9	65.6	79.20	3.72	4.64
1904	17.7	18.7	63.6	69.14	3.97	4.77
1905	21.1	19.6	59.3	72.50	4.28	5.26
1906	21.4	18.9	59.7	77.10	3.69	4.52
1907	21.3	17.7	61.0	82.60	3.76	4.65

WORLD'S PRODUCTION OF SUGAR.*a*

Year.	Total*c*	Per cent. beet.	Per cent. cane.	Per cent. of world's product consumed in United States.
	Pounds.			
1887	17,231,798,720	35.2	64.8	18.1
1888	16,507,841,440	37.2	62.8	18.3
1889	16,197,442,960	33.8	66.2	19.1
1890	18,636,976,160	43.0	57.0	17.2
1891	20,319,551,160	40.3	59.7	19.1
1892	20,120,525,280	38.4	61.6	19.5
1893	19,737,361,160	38.4	61.6	21.4
1894	21,617,857,880	39.8	60.2	22.9
1895	23,866,791,720	44.4	55.6	18.1
1906	20,685,586,240	45.9	54.1	21.7
1897	22,162,180,960	49.3	50.7	25.2
1898	21,809,352,320	49.3	50.7	15.9
1899	21,932,456,000	50.4	49.6	20.9
1900	24,274,564,160	50.8	49.2	18.5
1901	26,075,465,920	51.3	48.7	21.4
1902	28,677,349,120	53.2	46.8	17.5
1903	27,340,709,760	46.4	53.6	23.3
1904	26,820,279,360	50.9	49.1	21.1
1905	25,277,291,006	43.5	56.5	23.8
1906	32,547,507,680	49.7	50.3	19.9
1907	32,179,724,128	49.7	50.3	22.0

a Production is of the season preceding the fiscal year.
b Figures relate to continental United States after 1900.
c Includes Indian product, actual figures since 1902, and estimates based upon acreage for prior year.

THE BEST TIME TO WATER HORSES.

By F. W. Culver, M.D.C., Colorado Agricultural College, Fort Collins.

A horse should be watered before feeding, and never given a large quantity of water after a meal, for the simple reason that the water will wash the food out of the stomach before stomach digestion has taken place and the food will not be well prepared for absorption; and besides it is sometimes the cause of colic.

There is a popular idea that a warm horse should not be allowed to drink and, unlike a great many other popular ideas, there is a little truth in it. If you water a warm horse in the ordinary way, letting him drink all that he will, you are likely to have a foundered horse on your hands. This is especially so if, at the time, the horse is fatigued. Nevertheless, it is always safe to allow him from six to ten swallows, no matter how warm he is. If this be given on going into the stable and he be allowed to stand and eat hay for an hour and is then offered water, he will not drink nearly so much as he would had none been given before.

The danger is not in the first swallow, as we often hear it asserted, but in the excessive quantities he will drink if not restrained. The most dangerous time to give a horse a full draft is when he has cooled down from fatiguing work and has partaken of a meal.

John Splan, the great trainer, writes: "As to water, I think that a horse should have all that he wants at all times. A man says: 'Why; will you give your horse water before a race?' Yes; before the race, in the race, and after the race, and any other time that he wants to drink. When I say give your horse all the water he wants before the race, I do not mean that you shall tie him in a warm stall where he cannot get a drink for five or six hours and then give him all that he wants. What I mean is a hot day, and then take him to the pump to give him water often and, in that way, he will take only a small quantity at a time."

After long, continuous exertion the system is greatly depleted of fluid. Nature calls for its replacement, and this is the cause of a thirst which is so intense that, if the animal is not restrained at this time, he may drink much more than he needs.

The general custom, almost universally followed, of giving the morning meal before water, is not very objectionable, either theoretically or practically. At this time there is no depletion of fluid, consequently the horse is not very thirsty and does not drink rapidly or excessively, and apparently very little evil results from this method. However, the writer much prefers that the horse should have an opportunity to drink before the morning meal.

THE VALUE OF RECORDS.

Few enterprises make much progress until the things with which they deal are measured and recorded, so that accurate comparisons can be made. This is eminently true alike of the chemical and physical sciences and of many forms of industrial work, including agricultural operations.

When towards the close of the eighteenth century James Watt induced the owners of the Cornish mines to substitute his engines for the form then in use, he took as payment for these engines one-third of the saving effected in the coal consumed. This arrangement led to accurate measurements, not so much with the idea of saving fuel, but in order to ascertain the amounts to be paid. When, in 1800, this weighing of the coal ceased, the character of the work fell off and the coal consumption increased. Soon afterwards an accurate system of recording and reporting was again introduced, with such excellent results, that it is said that the practice of keeping accurate records is thought to have been attended with more benefit to the district than any other single event, excepting only the invention of the steam engine itself.

In connexion with planting industries in the West Indies, measurements, weighings, and records are in many cases very imperfect, so that progress is retarded thereby, and it is more than probable that the above experience might be repeated by agriculturists in these islands. The analogy is fairly close between weighing coal and weighing canes. In the case of the Cornish miners the weighing was undertaken for a specific purpose, but was ultimately found to have important collateral results. Doubtless the question frequently arose: "What is the good of weighing the coal? It does not make it give any more heat!" But the results were tangible and important, and so with the weighing of canes it would soon be found that the results more than repaid the cost.

It is not difficult to predict some of the directions in which the weighing of canes would yield remunerative results. Observations have shown that the work done by cane mills is extremely irregular, and that very great losses may remain undetected unless close records are kept. This is so fully recognized in large modern factories that very great attention is paid to the work done by the mill, both by the chemists and engineers, and constant results are recorded. Even with a small mill, if the canes were weighed, wasteful fluctuations would soon be discovered and stopped.

Further, in the absence of weighing, it is extremely difficult to know what results are obtained from any particular kind of cane, or from the use of any particular manure, or from the performance of any particular cultural operation. A knowledge of the weight of canes obtained would throw a flood of light on all these questions.

The judgment of the planter, unaided by a knowledge of the weight of cane, is frequently at fault in appreciating the value of new variety of cane. He may over-estimate, or under-estimate its merits, and so money will be wasted. With a knowledge of the weight obtained he would act with precision, so that rapid and steady progress would set in. How many planters can say with precision to what extent ratoon canes are remunerative in comparison with plant canes? A knowledge of weights would give precision to their ideas, and lead to the saving of money.

Similarly, much money is probably wasted in the matter of manures from want of knowledge, either too much manure or too little being employed. A knowledge of weights would, after a few years' experience, lead to a much more economical use of manures of all kinds.

The value of measuring and recording is not confined only to weighing of canes. It holds good of most facts relating to estate work.

Records of the cost of various operations, if carefully made and properly arranged, will tend to economy.

Records of the food consumed by stock, of work done, and of the cost, etc., worked out under various heads, will soon indicate when economics may be practiced, and increased returns obtained. Economics mean not merely diminished expenditure but expenditure to better advantage, and this in time may mean increased expenditure based upon accurate knowledge.

A distinction must be made between records and mere memoranda. The latter are notes taken for temporary use, the former are notes carefully preserved and arranged for future reference. The mere making of the record is not all-sufficient; it is necessary that the results obtained should be compared and correlated so that the conclusions to be drawn from them may be set out. There doubtless exists much material in the form of memoranda and records from which valuable deductions might be drawn if some one would take the trouble to arrange the information in a form of comparison.

If records such as those referred to could be obtained for a wide range of plantation work in various parts of the West Indies, and the results compared from time to time, it would be found that many changes by way of improvement would speedily spread from district to district, and the improved ideas of one place would quickly exert a beneficial influence at a distance, instead of as now, influencing only a small area, and even there producing but limited results for want of further stimulation.

One effect of the keeping and comparing of records must not be overlooked. This work reacts upon the planter, making him more alert and more observant, and he becomes keener to detect losses and to forward improvements, so that the general advancement of agriculture is ensured thereby.

COLONIAL SUGAR REFINING COMPANY.

The Colonial Sugar Refining Company held its semi-annual meeting at Sydney, New South Wales, on April 30, in which a report was made to the stockholders of a net gain of about $813,000. With the surplus left on hand previously about a million dollars was available for distribution and a dividend at the rate of 10 per cent. per annum was declared and $282,500 was carried forward as a surplus.

In the report to the stockholders it was stated that the adverse weather experienced at the various sugar factories during the last spring and summer caused a considerable reduction in the season's output and to some extent affected the growing cane crops. An increase in the consumption of sugar in Australia and in New Zealand is being anticipated by some addition to the buildings and plants at three of the refineries.

It was thought that the production of sugar in Australia would fall short of the consumption, rendering some importation necessary. This, of course, would tend to sustain values in Australia.

Efforts were recently made to demonstrate to the public that there was an unfair division in the profits of sugar manufacture between the sugar producers and the growers of sugar cane. The management of the Colonial Company stated that the claims made were simply absurd and that as a matter of fact the margin of profit to them as manufacturers was perhaps scarcely large enough, considering the risks involved.

MECHANICAL CANE LOADING.

Beginning some six years back, when the use of cane loading machines first began to attract the attention of the Louisiana sugar planters, the predominant idea in the purchase of various loaders, that were on the market the following three or four years, rested mainly on the saving in labor incident to the use of the machines, and the fact that hands could be secured to work the loaders in bad weather when all hand labor would not go into the field.

These features recommended the adoption of the cane loaders to all who were embarrassed by a shortage in labor, and resulted in such a wide purchase of loaders that the manufacturers of several of the popular styles were led into the error of turning out more loaders than they could well follow along with, in demonstrating the right way to run them to get the best results, during the campaigns subsequent to their sale; the consequence was that many planters experienced annoying troubles in their operation, and rather than worry along with them where no actual money saving was found, numerous purchasers either threw the loaders

back on the manufacturers' hands or relegated them to the plantation scrap heap.

Too rapid an outturn from the shops of the cane loader inventors also resulted, in many cases, in machines of a defective character being put into the cane fields, and with labor becoming more plentiful the past two sugar harvests, the tendency was to break further away from the use of loaders that had previously been operated solely because it was found a labor displacement could thereby be achieved, and there has come about a tendency to work only those loaders that effect an actual money saving per ton of cane handled.

The law of the survival of the fittest has indeed been inexorably applied to the manufacture of cane loaders, and where at one time within the past five years there were seven or eight cane loader inventors turning out their machines, there is today but two, these of standard makes that have eliminated the bad features heretofore existent in the earlier machines, and which have demonstrated beyond cavil that their use means a money economy in loading cane onto carts or wagons that is not to be despised.

With two successful cane loader manufacturing companies actively soliciting the planters' business, one building both mule-power and gasoline-power loaders, while the other builds only the latter type of loader, the opportunity is open to all to secure up-to-date cane handling appliances for their fields that will come close to cutting in half the cost of loading, or even do more. The advantages of a smoothly running loader, as all planters who have used such may testify, are so great in the time of strenuous crop removal as to have the device constitute what is considered by many one of the most important field adjuncts.

Even though labor promises plentiful for next fall, it must be remembered, when giving the purchase of cane loaders consideration, that mechanical loading does away with the heaviest hand work on the plantation, that it permits loading of carts to be done in weather when hand labor will not turn out, and that it does it faster and much cheaper, too. Either of these considerations are sufficient to justify the use of cane loaders on every sugar place in the State where the daily deliveries to the mills are in excess of say 70 tons.—Louisiana Sugar Planters' Journal.

CARELESSNESS IN HANDLING ICE.

Scarcely another article of human consumption receives so much direct handling just before its use as does this food. Milk and water, tea and coffee are poured. Bread, meat and butter are cut. Bread, probably handled more than any other food on the list, has a hard crust which offers a rather unfavorable lodging place for germ life. Ice, on the contrary, washes the hands of

every person who handles it and affords an ever ready liquid medium for the immediate absorption of the hosts of bacteria which hands may carry.

The carelessness of the handlers of ice, their utter disregard of the resting places where it may receive infection, may be partly due to their lack of realization that ice is a food, as real a food as meat. Whatever the cause, few substances which pass through the digestive processes of man receive such treatment. Its surface contaminated by the passage of men and horses in the cutting, its sides and base fouled by muddied platforms and smirched straw, covered with the filth of black ice-cars and dust-swept freight stations, your cake of ice commonly receives its only cleaning just before it enters the ice-chest. So far as the ice-man is concerned, this is generally a hasty brush with a time-worn whisk broom well filled with the dust of the street and blackened with constant use. Ice should be thoroughly washed before it is put in the ice chest.

FOREST PRODUCTS PAY ALL TAXES.

In recent news columns appears an item on the "immense profits of German forests." Numerous towns and cities maintain large holdings, Baden having 10,576 acres, yielding an annual net profit of $66,080, or approximately $6.25 an acre, Freiburg having 8,085 acres, yielding a net profit of $46,336, or $5.79 an acre, and Heidelburg, 6,860 acres, the clear profit on which each year is $12,635. The village of Aufen, with 220 inhabitants, has 163 acres of timberlands, the proceeds from which suffice for all the expenses of the little community.

In the village of Braunlingen, which has 1,601 inhabitants and 4,507 acres of orests, there is an allowance to the citizens of firewood and 100,000 board-feet of lumber is given to churches, schools, and other public institutions. From the timber sold, the net income is $21,600, and Braunlingen not only is free from all communal taxes, but is enabled to establish electric plants, waterworks, and other public improvements.

In Forestry and Irrigation for September, 1907, (pages 446 and 447), was published a clipping from the London, England, Bystander, regarding the town of Faleide, Norway, of which it was said: "The town of Faleide, Norway, imposes no taxes on its lucky inhabitants. During the last thirty years the authorities of Faleide have sold over $5,000,000 worth of trees; and, by judicious replanting, have provided for a similar income every thirty years. In consequence of this source of commercial wealth, there are no taxes in Faleide, and local railways and telephones

are free, as well as education—and drinks upon the king's birthday."

There is a proverb in the United States that two things are inevitable, namely, "death and taxes." The cases of Braunlingen, Faleide, and the other towns named above, appear to be exceptions. In commenting upon the Faleide situation, Forestry and Irrigation called attention to sources of municipal income, aside from the taxpayer's pocket, in other towns than those named. Ancient Athens derived a substantial revenue from her silver mines at Laurium. The town of Fairhope, Ala., owns a wharf, fees for the use of which constitute a valuable source of revenue for the village. The city of Chicago still owns her sixteenth section, set apart for school purposes, from the rentals of which the city derives a splendid annual revenue.

America is coming to realize that there is money in wood. As this fact, however, is borne in upon her more strongly through the progressive depletion of our timber supply and the consequent enhancement in price of all wood products, why may not American cities and towns emulate the example of the European towns above mentioned, buy up cheap lands in the neighborhood of their limits, maintain them in forests managed according to forestry principles, and sell the annual product, to the material advantage of their municipal treasuries?

CANE SUGAR IN JAPAN.

We have in this country a variety of cane sometimes called Zwenga and sometimes Japan cane. This cane is raised at present to a considerable extent in Florida and is a genuine sugar cane, although not of as good quality as our standard purple and striped canes. There has been an impression abroad that Japan raised no sugar cane on the main land of its island and was now dependent upon its recent acquisition of Formosa for cane sugar grown under its own control.

We now learn, from the inquiries instituted by Mr. Otto Licht of Magdeburg, Germany, certain data derived from the official reports concerning cane culture in certain districts in Japan, in Honshiu, Central and Western, Shikoku, Kiushiu, Hokkaido, or Yezo. The area planted altogether aggregated about 45,000 acres of sugar cane and the cane crop gathered reached 554,000 metrical tons, a yield of only about 13 tons per acre. The amount of sugar obtained was 50,872, an industrial yield of 9.5 per cent. This would indicate that Japan has a very positive cane sugar industry of its own at home.

The attention now given by Japan to the development of the sugar industry in Formosa bids fair to make that island a very prominent sugar producer. Formosa is 235 miles long and has an area of about 15,000 square miles and a population of about two millions. The island is certainly capable of making half a million tons of cane sugar at no very remote date and the Japanese certainly have in mind accomplishing this, considering how actively they are now going into the sugar industry there with everp improved device known to them. The native population of Formosa is a race similar to the Japanese themselves and they seem to resent very severely the taking over of their lands without their consent and it may be difficult to put these two millions of people to work at any early date. That problem is for the Japanese. Ours seems to lie in the Philippines, where five or ten million tons of sugar could be produced with ease if the eight or ten millions of Filipino people would all work like industrious American farmers. Wasn't it Dean Swift who said, "You can't make a silk purse out of a sow's ear?" and it may be a little difficult for us to make good American citizens out of President Taft's pets, but we fancy the Japanese wont worry themselves much over the matter, but will simply annihilate their opponents and fill the country with home grown Japanese as the need arises.